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## PATENT SPECIFICATION



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### PROVISIONAL SPECIFICATION.

#### Improvements in Chucks.

We, Sir ALFRED HERBERT, a British subject, of Dunley Manor, near Whitechurch, Hampshire, and ARTHUR HAROLD LLOYD, a British subject, of 33, Styvechale Avenue, Earlsdon, Coventry, Warwickshire, do hereby declare the nature of this invention to be as follows:—

This invention relates to chucks, and particularly to drill chucks for parallel shanked drills or like tools of the kind in which there is a threaded connection between the chuck body and the driving shank or equivalent to effect the gripping and the release of the drill, and it has for its principal object to provide simple and easily operated means whereby, while in motion, such a chuck can be opened and closed to change a drill, the use of a chuck of this description permitting the accommodation of a greater range of drill sizes than is usually possible with other types of self opening chucks. Further objects are to ensure an instantaneous release of the drill and to provide a jaw-actuating member which does not rotate in the operator's hands, during the changing of a drill.

According to this invention, a split nut is employed to connect the shank or its equivalent with the chuck body, and is engaged or disengaged by the agency of operating means such as a sleeve loosely mounted upon the said body.

Preferably the control of the split nut is effected by an axial movement of the aforesaid sleeve, and for this purpose there is provided around the inner part of the sleeve a coned surface constituting a conical wedge adapted to engage correspondingly coned exterior portions of the nut to thrust the split parts radially into engagement against spring or other action tending to disengage them.

The axial movement of the sleeve to disengage the split nut may be effected against the thrust of a spring which tends always to hold the sleeve so that the nut

is in engagement, and after release of the latter, continued movement of the sleeve axially brings it against an abutment on the body part and slides the latter freely along the threaded part of the shank so that the jaws are caused to open.

In one method of carrying out the invention, the chuck body is carried upon a shank which engages in the driving spindle of the drill, lathe, or other machine tool in any convenient manner, as for instance by forming on it the known standard taper. This shank has a parallel-sided portion on which the inner end of the chuck body can slide and also rotate, and beyond this is a reduced threaded portion which the split nut is adapted to engage.

The body portion of the chuck is of cylindrical form and has an axial bore, part of which can slide freely over the threaded portion of the shank, while the remaining part is of enlarged bore to seat on the plain parallel portion of the shank in the manner above mentioned. The outer surface of the body is reduced in diameter along the part in which the bore is smaller, leaving a plain parallel portion at its inner end, and its outer end is threaded for engagement by the usual nose piece of internal and external conical form which engages the conical sides of the jaws in the known manner to close them and to open them positively, or alternatively to allow them to open under the action of a spring or springs in any known or convenient manner.

In the externally reduced part of the body, and preferably close to the shoulder formed by so reducing it, are provided radial apertures, preferably two or more in number spaced equally around. Fitting in them slidably are pads which have threads formed at their inner ends to engage the threaded portion of the drill shank, thereby to constitute the split nut. Around the body part, and



intersecting the radial apertures is a circumferential groove for the reception of a spring ring which extends transversely through the outer ends of the pads and tends always to withdraw them from engagement with the threaded shank.

5 Mounted loosely (*i.e.*, rotationally and axially freely), upon the body part of the chuck, so that one end is supported on the 10 plain unreduced part of the body and the other end upon a similar plain parallel portion of the nose piece, is a sleeve which thus bridges over the reduced portion of the body and provides around it 15 an annular space. This sleeve has at this part an inwardly directed flange whose edge is coned so that it converges towards the drill, forming a conical wedge; and this is adapted to bear upon the outer 20 ends of the pads, which are correspondingly inclined to agree therewith. Between the outer face of this flange and a shoulder formed by reducing the plain part of the nose piece, is located a compression spring which thus acts always 25 to thrust the sleeve axially towards the shank, thereby to cause the elements of the split nut to be held in engagement with the threaded shank by the agency of the aforesaid conical wedge. The arrangement of the compression spring is thus 30 such that the outer face of the coned flange can abut the end of the reduced portion of the nose piece, after a permissible 35 axial movement of the sleeve sufficient to allow the split nut to disengage, and thereafter by continued movement is adapted to draw the whole body part along the threaded portion of the shank, 40 opening the jaws in the process, in the known manner.

To permit of a secure grip upon the sleeve when the operator applies axial force to it, the exterior surface is preferably corrugated circumferentially or 45 spirally.

In use the chuck can readily be opened or closed while rotating, and to open it

the operator grasps the sleeve (which has only frictional engagement with the body 50 through pressure upon the ends of the pads forming the split nut) and applies an axial pressure which first disengages it from the nut and allows the latter to disengage the thread, a further axial 55 movement then moving the body part so as to open the jaws. Thus the drill, can be removed and changed for one of different size, and then, to close the jaws, the axial pressure upon the sleeve is 60 removed, when, under the pressure of the spring, it acts to re-engage the nut, and by frictional contact with the latter, which can be increased by axial pressure, while still gripped by the operator, closes 65 up the jaws until they bite. Should the grip thus imparted be insufficient for effective driving, the resistance which the drill encounters in the work then aids to complete the screwing-up of the chuck 70 body and the tightening of the jaws.

The invention provides a chuck of considerable working range having instantaneous releasing means with self-tightening jaws, and furthermore has the advantage 75 that the operating sleeve does not rotate during the drill changing process so that risk of injury to the operator is avoided, the jaws also remaining stationary while the drill is inserted. 80

The construction has the known advantage of a tapered nose and the shank is included with the chuck thus making it a self contained unit, and all the wearing parts can be hardened. A button or pad 85 may be employed to support the jaws and to guide their radial movements, this pad acting also as a thrust piece between the inner ends of the jaws and the threaded end of the chuck shank. 90

Dated this 12th day of January, 1922.

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Agent for the Applicants.

## COMPLETE SPECIFICATION.

### Improvements in Chucks.

We, Sir ALFRED HERBERT, a British subject, of Dunley Manor, near Whitechurch, Hampshire, and ARTHUR HAROLD LLOYD, a British subject, of 33, Styvechale Avenue, Earlsdon, Coventry, Warwickshire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by 100 the following statement:—

This invention relates to chucks, and

particularly to drill chucks for parallel shanked drills or like tools of the kind in which there is a threaded connection 110 between the chuck body and the driving shank or equivalent to effect the gripping and the release of the drill, and it has for its principal object to provide simple and easily operated means whereby, while 115 in motion, such a chuck can be opened and closed to change a drill, the use of a chuck of this description permitting



the accommodation of a greater range of drill sizes than is usually possible with other types of self opening chucks. Further objects are to ensure an instantaneous release of the drill and to provide a jaw-actuating member which does not rotate in the operator's hands, during the changing of a drill.

According to this invention, a divided nut is employed to connect the shank or its equivalent with the chuck body, and can be engaged or disengaged during the rotation of the chuck by the agency of operating means, such as a sleeve loosely mounted upon the said body.

Preferably the chuck comprises an externally screw-threaded driving shank, a tool-carrying body loosely mounted thereon, provided with a divided nut engageable with the threaded shank, and a sleeve loosely mounted upon the body and axially movable to disengage the nut and free the drive. This sleeve normally rotates with the chuck body but it can be held stationary during rotation of the chuck, and enables the operator, by applying to it an axial thrust, to set up such a frictional grip upon the divided nut that the chuck can be screwed up until the jaws effectively engage the drill or other tool inserted therein.

In the accompanying drawings,

Figure 1 is a central sectional view in the axial plane of the chuck.

Figure 2 is an outside elevation corresponding to Figure 1.

Figure 3 is a cross section on the line 3, 3 of Figure 1, and

Figure 4 is an end view as seen from the acting end of the chuck.

The chuck body A is carried upon a shank A<sup>3</sup> which engages in the driving spindle of the drill, lathe, or other machine tool in any convenient manner, as for instance, by forming on it the known standard taper. This shank has a parallel-sided portion A<sup>3</sup> on which the inner end part A<sup>4</sup> of the chuck body can slide and can also rotate, and beyond this is a reduced threaded portion A<sup>5</sup> which the split nut is adapted to engage.

The body portion of the chuck is of cylindrical form and has an axial bore A<sup>6</sup>, within which can slide freely the threaded portion A<sup>5</sup> of the shank, while the remaining part seats on the plain parallel portion A<sup>3</sup> of the shank A<sup>2</sup> in the manner above mentioned. The outer surface of the body A is reduced in diameter for a certain distance at A<sup>7</sup>, leaving a plain parallel portion A<sup>8</sup> at its inner end, and its outer end is threaded at A<sup>9</sup> for engagement by the usual nose piece B of internal and external conical form which engages the conical sides of the jaws B<sup>2</sup> in the

known manner to close them and to open them positively, or alternatively to allow them to open under the action of a spring or springs in any known or convenient manner.

In the externally reduced part of the body, and preferably close to the shoulder formed by so reducing it, are provided radial apertures A<sup>10</sup>, preferably two or more in number spaced equally around. Fitting in them slidably are pads C which have threads formed at their inner ends to engage the threaded portion of the drill shank, thereby to constitute the divided nut. Around the body part, and intersecting the radial apertures A<sup>10</sup> is a circumferential groove A<sup>11</sup> for the reception of a spring ring D which extends transversely through the outer ends of the pads C and tends always to withdraw them from engagement with the threaded shank A<sup>5</sup>.

Mounted loosely (i.e., rotationally and axially freely), upon the body part of the chuck, so that one end is supported on the plain unreduced part of the body at A<sup>8</sup> and the other end upon a similar plain parallel portion B<sup>3</sup> of the nose piece B, is a sleeve E which thus bridges over the reduced portion A<sup>7</sup> of the body and provides around it an annular space E<sup>2</sup>. This sleeve has at this part an inwardly directed flange E<sup>3</sup> whose edge or inner periphery E<sup>4</sup> is coned so that its sides converge towards the drill jaws B<sup>2</sup> forming a conical wedge, and this is adapted to bear upon the outer ends of the pads C, which are correspondingly inclined to agree therewith. Between the outer face of this flange and a shoulder B<sup>4</sup> formed by reducing the plain part B<sup>3</sup> of the nose piece B, is located a compression spring F, which thus acts always to thrust the sleeve E axially towards the shank A<sup>2</sup>, thereby to cause the elements C of the divided nut to be held in engagement with the threaded shank A<sup>5</sup> by the agency of the aforesaid conical wedge E<sup>4</sup>. The arrangement of the compression spring is thus such that the outer face E<sup>5</sup> of the coned flange can abut the end B<sup>5</sup> of the reduced portion B<sup>3</sup> of the nose piece, after a permissible axial movement of the sleeve sufficient to allow the divided nut to disengage under the action of the spring D, and thereafter by continued movement is adapted to draw the whole body part A along the threaded portion A<sup>5</sup> of the shank, opening the jaws B<sup>2</sup> in the process, in the known manner.

To permit of a secure grip upon the sleeve when the operator applies axial force to it, the exterior surface is preferably corrugated circumferentially as shewn, or spirally.



In use the chuck can readily be opened or closed while rotating, and to open it the operator grasps the sleeve E (which has only frictional engagement with the body A through pressure upon the ends of the pads C forming the divided nut), and applies an axial pressure which first disengages it from the pads C and allows the latter to disengage the thread at A<sup>5</sup>, a further axial movement then moving the body part A<sup>5</sup> so as to open the jaws. Thus a drill carried in the jaws B<sup>3</sup>, can be removed and changed for one of different size, and then, to close the jaws, the axial pressure upon the sleeve is removed, when, under the pressure of the spring F, it acts to re-engage the nut, and by frictional contact with the latter, which can be increased by axial pressure, while still gripped by the operator, closes up the jaws until they bite. Should the grip thus imparted be insufficient for effective driving, the resistance which the drill encounters in the work then aids in the known manner to complete the screwing-up of the chuck body and the tightening of the jaws.

The invention provides a chuck of considerable working range having instantaneous releasing means with self-tightening jaws, and furthermore has the advantage that the operating sleeve E does not rotate during the drill changing process so that risk of injury to the operator is avoided, the jaws also remaining stationary while the drill is inserted as the whole body portion of the chuck is freed from the driving shank A<sup>3</sup>.

The construction has the known advantage of a tapered nose piece B and the shank is included with the chuck thus making it a self-contained unit, and all the wearing parts can be hardened. A button or pad G may be employed to support the jaws and to guide their radial movements, this pad acting also as a thrust piece between the inner ends of

the jaws and the threaded end of the chuck shank, and having a swivel connection with the latter at G<sup>2</sup>. 50

The outer end A<sup>13</sup> of the shank preferably has a sleeve H screwed upon it to form a guide for the outer end of the body A by engagement with the bore A<sup>6</sup> therein, and a collar H<sup>2</sup> upon the sleeve forms a stop which limits the axial movement of the body A on the shank in opening the chuck. 55

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:— 60

1. In a chuck of the kind referred to, the employment in the threaded connection of the body and the shank or equivalent, of a divided nut, and of means for engaging and disengaging it while the chuck is rotating, substantially as and for the purpose described. 70

2. A chuck as claimed in Claim 1, comprising an externally screw-threaded driving shank, a tool-carrying body loosely mounted thereon, provided with a divided nut engageable with the threaded shank, and a sleeve loosely mounted upon the body and axially movable to disengage the nut and free the drive, substantially as and for the purpose described. 75

3. A chuck as claimed in Claim 2, in which the sleeve normally rotates with the chuck body, but can be held stationary during rotation of the chuck, substantially as and for the purpose described. 80

4. The complete chuck, substantially as described or as illustrated in the accompanying drawings. 85

Dated this 13th day of September, 1922.

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[This Drawing is a reproduction of the Original on a reduced scale]

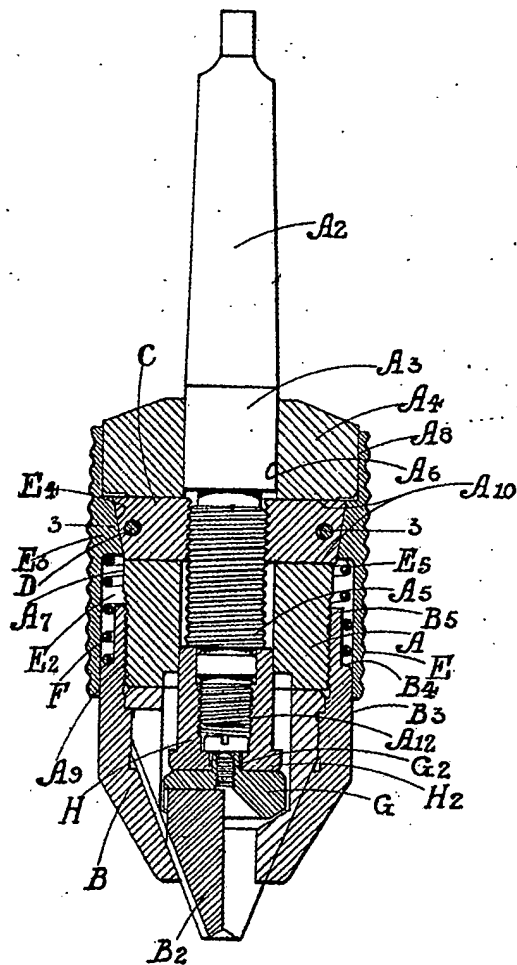


Fig. 1.

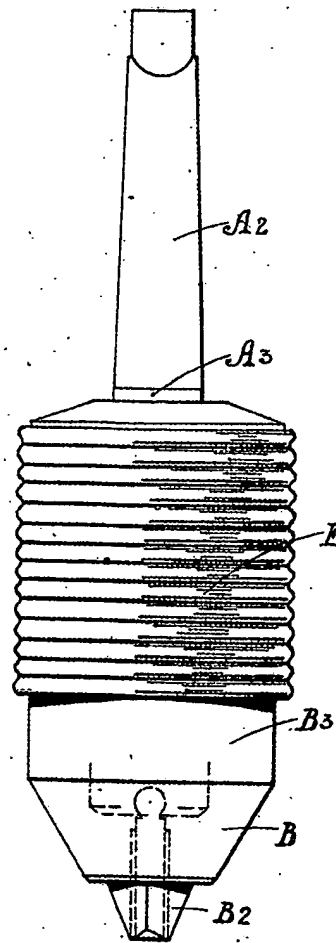


Fig. 2.

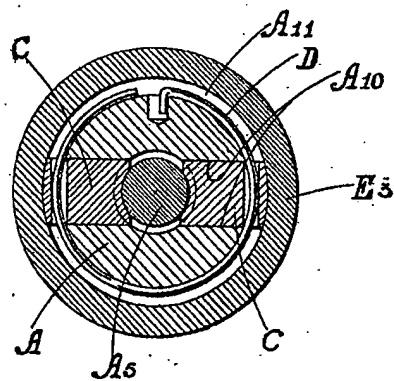


Fig. 3.

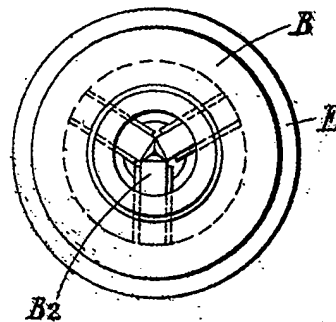


Fig. 4.